

CITY OF TUCSON WATER DEPARTMENT



WATER QUALITY MANAGEMENT DIVISION





TUCSON WATER is pleased to provide our customers with this fourth Annual Water Quality Report. The report will serve as a reference with important information on the quality of water we deliver, provide you with contacts and phone numbers you may need from time to time, and fulfill a federal regulatory requirement to give you annual information about the source and quality of your drinking water.

WHERE DOES OUR DRINKING WATER COME FROM?

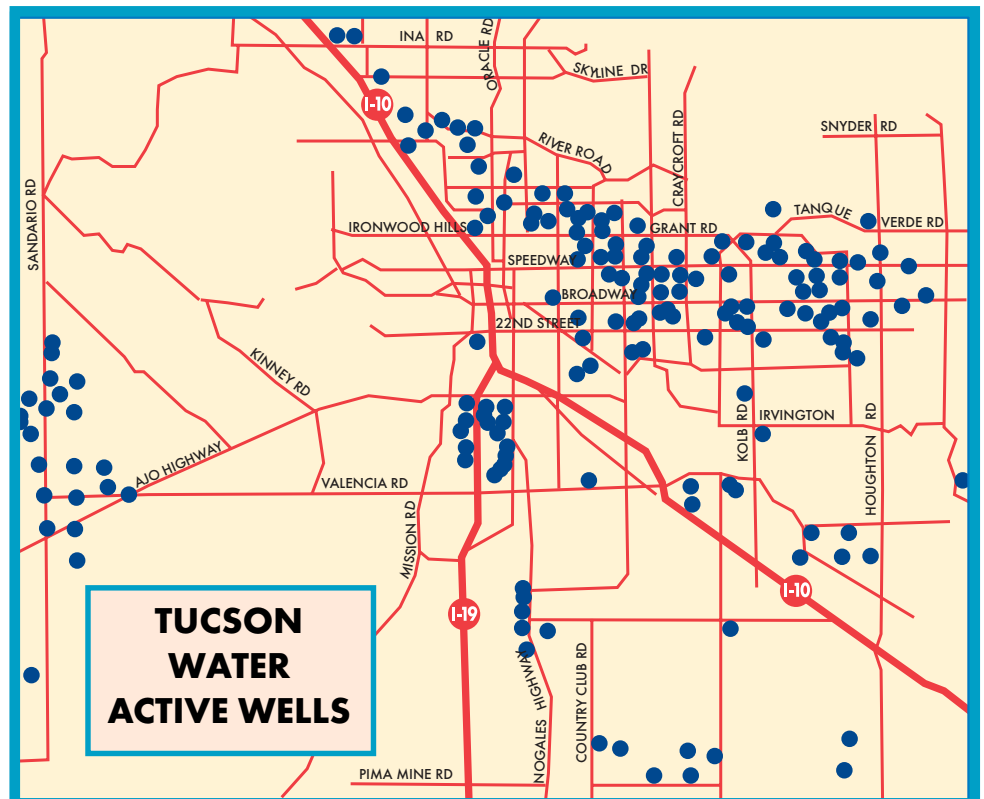
In 2001, Tucson Water served about 675,000 people in the Tucson area. The water supply came from approximately 204 groundwater wells located in and

around the Tucson metropolitan area (see map). In urban Tucson, most of the wells (also known as Points of Entry or POE) serve the neighborhood in which they are located, with excess supply routed to reservoirs for use elsewhere in the system. Wells located outside the urban core often deliver water to a single "collector" main prior to delivery to customers. In these cases, the collector main is termed a "combined Point of Entry" to the drinking water system. The Tucson Water system has four combined Point of Entry: the Clearwater well field, the Southern Avra Valley well field, the Santa Cruz well field, and the South Side well field, which includes Tucson Airport Area Remediation Project (TARP).

This report contains the following information:

- Where does our drinking water come from?
- What contaminants have been detected in our drinking water?
- Information on expected drinking water contaminants.
- Definitions of technical and regulatory terms used in the report.
- Information on detected contaminants.
- Were there any violations of drinking water regulations?
- What about CAP water?
- How is our drinking water treated?
- Information about TARP.
- Who can I contact for more information?

If you are a non-English speaking resident, we recommend that you speak with someone who understands this report. Call our Public Information Office at 791-4331 for a copy of this report in Spanish. The Arizona Safe Drinking Water Regulations consistent with Federal requirements require all public water providers to deliver this information to all customers on an annual basis.





WHAT CONTAMINANTS HAVE BEEN DETECTED IN OUR DRINKING WATER?

Tucson Water regularly samples the drinking water that is delivered to you. Much of this testing is required by drinking water regulations. In addition to this required monitoring, we perform a great deal of discretionary monitoring in order to provide both Tucson Water staff and customers with additional information. The table on page 4 lists only contaminants that were detected in both the required and discretionary drinking water monitoring.

Three inorganic contaminants of special interest are arsenic, fluoride, and nitrate. Fluoride and arsenic are naturally occurring and tend to increase as water is drawn from greater depths. Nitrate, on the other hand, is typically found in higher concentrations near the surface of the groundwater table because it is frequently associated with fertilizer use, septic tanks and other human activities. For more information, please see the Detected Contaminants Table and the specific explanations, which follow the table.

It is important to remember that the detection of a contaminant in drinking water does not necessarily represent a threat to public health. Current technology allows water utilities to detect extremely low levels of contaminants in drinking water. A detected result means a concentration that is above the minimum value that can be measured by the laboratory. In most cases, the minimum detectable level of a contaminant is well below the USEPA regulatory limit for that contaminant.

To compare the detected amount with the amount allowed by the USEPA, refer to the Maximum Contaminant Level (MCL) column in the table. (Because the vast majority of regulated contaminants were not detectable in drinking water delivered by Tucson Water, the non-detected results were not included in this table.) For a complete list of all USEPA regulated contaminants contact the USEPA at 1-800-426-4791 or visit the USEPA website at www.epa.gov/ogwdg/wot/appa.html.

A SPECIAL NOTE TO AT-RISK POPULATIONS

While the Safe Drinking Water Act regulations are intended to protect consumers throughout their lifetime, some people may be more vulnerable to infections from drinking water than the general population. These “at-risk” populations include: immuno-compromised persons such as persons with cancer undergoing chemotherapy, people who have undergone organ transplants, people with HIV / AIDS or other immune system disorders, and in some cases, elderly people and infants. These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbial contaminants are available from the USEPA’s Safe Drinking Water hotline.

INFORMATION ON EXPECTED DRINKING WATER CONTAMINANTS

All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants.

Tucson’s groundwater contains dissolved minerals and organic compounds, which have been leached from the rock, sediments, and plant materials through which the water traveled. One would expect to find beneficial minerals such as calcium and magnesium, harmless minerals such as chloride, bicarbonate, and sulfate, and metals such as iron, copper, arsenic, and lead, which may be either beneficial or harmless at low concentrations, but harmful at high concentrations. In addition to these naturally occurring contaminants, our groundwater may contain contaminants resulting from human, industrial or domestic activities. For this reason, water utilities must currently monitor for approximately 90 regulated and 12 unregulated contaminants.

The following language is required by the USEPA to appear in this report, some of which may not be applicable to deep groundwater wells, the source of the Tucson Water supply.

Contaminants that may be present in a source water can include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage, agricultural livestock, and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, USEPA regulations limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water that must provide the same protection for public health. Bottled water may come from either a surface water source or groundwater source, and may be treated minimally or extensively. For information on the quality of your bottled water, contact the water bottling company.

DETECTED CONTAMINANTS TABLE

Contaminant	Maximum Result	Range	MCL	MCLG	Major Sources	
Inorganics						
Arsenic	10 ppb	<2 – 10 ppb	50 ppb	None	Natural deposits	
Barium	0.14 ppm	<0.02 – 0.14 ppm	2 ppm	2 ppm	Natural deposits	
Fluoride	2 ppm	<0.1 – 2 ppm	4 ppm	4 ppm	Natural deposits	
Nitrate (as N)	9.2 ppm	0.36 – 9.2 ppm	10 ppm	10 ppm	Natural deposits; septic tanks; agriculture; sewage	
Radiochemical						
Adjusted Gross Alpha	4.4 pCi/L	0.1 – 4.4 pCi/L	15 pCi/L	0 pCi/L	Natural deposits	
Radon Activity ¹	1420 pCi/L	<20 – 1420 pCi/L	No MCL	None	Natural deposits	
Uranium Activity	18.9 pCi/L	<0.527 – 18.9 pCi/L	30 pCi/L	None	Natural deposits	
Volatile Organics						
Ethylbenzene	1.3 ppb	<0.5 – 1.3 ppb	700 ppb	700 ppb	Solvent used in paint coatings; component of aviation and automotive gasoline	
Tetrachloroethene (PCE)	0.9 ppb	< 0.5 – 0.9 ppb	5 ppb	0 ppb	Dry cleaning agent; degreaser	
Methyl-tert-butyl Ether	0.6 ppb	<0.5 ppb–0.6 ppb	No MCL	None	Fuel additive	
Total Xylenes	0.0103 ppm	<0.0005–0.0103 ppm	10 ppm	10 ppm	Solvent used in paint coatings, adhesives, and fuel	
Synthetic Organics						
Di(2-ethylhexyl)phthalate	7.1 ppb	< 0.6 – 7.1 ppb	6 ppb	0 ppb	Rubber and plastic manufacturing	
Diquat	0.4 ppb	< 0.4 – 0.4 ppb	20 ppb	20 ppb	Herbicide	
Simazine	0.14 ppb	< 0.05 – 0.14 ppb	4 ppb	4 ppb	Herbicide	
Unregulated Contaminant Monitoring Rule (UCMR)						
Perchlorate	11.9 ppb	< 4 – 11.9 ppb	No MCL	None	Primary ingredient of solid rocket propellant	
Total Trihalomethanes ² (TTHMs)						
TTHMs	7.9 ppb	< 0.5 – 7.9 ppb	80 ppb	0 ppb	By-product of chlorination	
Annual Average for TTHMs	2.1 ppb					
ADDITIONAL CONTAMINANTS						
Additional Volatile Organics						
Bromomethane	0.6 ppb	< 0.5 – 0.6 ppb	No MCL	None	Fumigant for ground pest control	
Hexachlorobutadiene	0.6 ppb	< 0.5 ppb – 0.6 ppb	No MCL	None	Petrochemical plant and refinery waste	
Additional Synthetic Organics						
Diethylphthalate	17 ppb	< 0.5 – 17 ppb	No MCL	None	Used in plastics and other common products	
Paraquat	2.7 ppb	< 2 – 2.7 ppb	No MCL	None	Herbicide	
Contaminant	No. of Samples Above the Action Level	90 th Percentile Value	Action Level	MCLG	Major Sources	
Lead and Copper in Standing Water Samples - 1999						
Lead	one	3.4 ppb	15 ppb	0	Corrosion of household plumbing systems	
Copper	none	0.23 ppm	1.3 ppm	1.3 ppm	Corrosion of household plumbing systems	
Contaminant	Month of Highest Coliform %	Number of Positive Samples for Month	Total # of Samples Collected for Month	MCL ³	MCLG	Major Sources
Microbiological						
Total Coliform	September	1	249	≥ 5%	0	Naturally present in environment
	October	2	252	≥ 5%	0	Naturally present in environment

¹ Data from the year 2000.

² MCL for Trihalomethanes are based on the Annual Average.

³ The MCL for microbiological contaminants is 5% of the total number of samples collected in the month.

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DEFINITIONS OF TECHNICAL AND REGULATORY TERMS

Action level. The concentration of a contaminant which, if exceeded, triggers a treatment or other requirement which a water system must follow.

Maximum Contaminant Level (MCL). The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology. If a contaminant is believed to cause health concerns in humans, then the MCL is set as close as practical to zero and at an acceptable level of risk. Generally, the maximum acceptable risk of cancer is 1 in 10,000 with 70 years of exposure.

Maximum Contaminant Level Goal (MCLG). The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Parts Per Billion (ppb). Some constituents in water are measured in very small units. One ppb equals one microgram per liter. For example, one part per billion equals: 2 drops of water in a 15,000 gallon backyard swimming pool, one second of time in 31.7 years, or the first 16 inches of a trip to the moon.

Parts Per Million (ppm). One ppm equals one milligram per liter. One part per million equals: 1/4 cup of water in a typical 15,000 gallon backyard swimming pool or one second of time in 11.6 days.

Picocurie Per Liter (pCi/L). The quantity of radioactive material in one liter which produces 2.22 nuclear disintegrations per minute.

Point of Entry (POE). All water sources are monitored at the point of entry to the distribution system before the first customer but after any required treatment.



INFORMATION ON DETECTED CONTAMINANTS

Arsenic EPA recently finalized a reduction in the arsenic drinking water standard from 50 ppb down to 10 ppb. All water utilities must meet this future standard beginning January 2006. Some people who drink water containing arsenic in excess of the future MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer. While your drinking water meets USEPA's standard for arsenic, it does contain low levels of arsenic. USEPA's new standard balances the current understanding of arsenic's possible health effects against the cost of removing arsenic from drinking water. USEPA continues to research the health effect of low levels of arsenic which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damages and circulatory problems. The highest arsenic concentration during 2001 was 10 ppb. For more information and a color coded map indicating the arsenic concentrations in our wells, please visit our website: www.cityoftucson.org/water/.

Barium occurs naturally at very low concentrations in our groundwater.

Fluoride is an important naturally occurring mineral that helps to form healthy teeth and bones. A concentration of 1 ppm is considered optimum. At concentrations above 2 ppm, fluoride can cause mild discoloration of teeth, and exposure at above the MCL of 4 can cause both severe discoloration of teeth and over many years of exposure, bone disease.

Nitrate is a form of nitrogen and an important plant nutrient. The highest level for nitrate was 9.2mg/l, which was found in well Z-001A. This well has been shut down since October 2001. Tucson Water is in the process of modifying the screen interval for this well, such that water containing less nitrate can be withdrawn from a deeper level. The next highest nitrate level found was 6.4 ppm.

Tucson Water performs extra monitoring on wells high in nitrate for extra assurance that action can be taken when approaching the MCL. Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome.

Adjusted Gross Alpha is a measure of radioactivity due to naturally occurring minerals in groundwater. The MCL for gross alpha radioactivity is set at 15 picocuries per liter (pCi/l). This excludes the radioactivity contributed by either radon or uranium.

Radon is a naturally occurring radioactive gas that may cause cancer, and may be found in drinking water and indoor air. While ingesting radon in drinking water has a small risk, inhaling radon is a primary health concern, particularly for smokers or ex-smokers. Radon diffusing up from the soil into homes and buildings is usually the main source of radon in indoor air. Only about 1-2 percent of radon in indoor air comes from drinking water.

If you are concerned about radon in your home, you should test your house and install controls if you find a level of 4 pCi/l or higher in your indoor air. For more information, call USEPA's Radon Hotline (800-SOS-RADON) or visit the web site <http://www.epa.gov/iaq/radon/>.

The USEPA does not currently have a final regulation for radon in drinking water.

Extra radon monitoring was performed on the Tucson Water wells in two quarters during 2000. Test results indicate that, when compared with other communities across the country, Tucson has fairly typical concentrations for radon in the water supply. For more information on radon, please visit our website:

www.ci.tucson.az.us/water/

Uranium is a metallic element, which is highly toxic and radioactive. The USEPA has set a new standard of 30 ppb or approximately 30 pCi/l for uranium, which water systems must meet by December 2003.

Volatile Organic Compounds (VOCs) include such compounds as trichloroethylene (TCE) and tetrachloroethylene (PCE). VOCs are volatile, like alcohol or gasoline, and are made up of relatively small molecules, which allows them to migrate readily through soils. Solvents such as TCE and PCE have been commonly used for cleaning machine parts, and for dry cleaning. These contaminants are often associated with industrial operations and landfills. Despite the vulnerability of groundwater to such contamination, Tucson Water's potable supplies are virtually free of such contamination.



INFORMATION ON DETECTED CONTAMINANTS (CONTINUED)

Ethylbenzene and Xylenes are residual solvents, typically associated with the coatings used to protect new or refurbished water pressure tanks. These low concentration releases from pressure tank coatings rapidly decrease as the tank ages. Two POEs had ethylbenzene, of which 1.3 ppb was the maximum (the MCL is 700ppb), and six POEs had total xylenes, of which 0.0103 ppm was the maximum (the MCL is 10 ppm).

Tetrachloroethylene (PCE) is a solvent used by industry and dry cleaners. It was detected in three POEs, maximum of which was 0.9 ppb

Methyl-tert-butyl Ether (MTBE) was detected in only a single well at the very low concentration of 0.6 ppb. MTBE is a popular gasoline additive used to reduce air pollution. EPA is currently reevaluating its use due to its threat to water supplies. While MTBE is not thought to be a significant health threat at low concentrations, it has a very low taste and odor threshold and is difficult to remove from drinking water supplies by treatment. Unlike most VOCs, MTBE is very soluble in water. This property allows it to move readily with percolating water and contaminate groundwater much more readily than the less soluble components of gasoline. MTBE does not appear to present a major threat to Tucson's groundwater supplies.

Bromomethane and Hexachlorobutadiene are industrial solvents and were both detected at 0.6 ppb.

Synthetic Organic Contaminants - The well monitoring program rarely detects SOC's with the exception of a chemical called Di(2-ethylhexyl) phthalate, DEHP. Unlike VOC's, which have been repeatedly shown to readily migrate through soils to groundwater, SOC's are generally less mobile. In the 2001 monitoring program, only three SOC's were detected. Diquat was detected once at the detection limit of 0.4 ppb, and simazine was detected once at 0.14 ppb. However, DEHP was detected 23 times and, on one occasion, the concentration was 7.1 ppb, which is greater than the MCL. DEHP is the most commonly used of a group of related chemicals called phthalates or phthalic acid esters. The greatest use of DEHP is as a plasticizer for polyvinylchloride (PVC) and other polymers including rubber, cellulose and styrene. A number of packaging materials and tubings used in the production of foods and beverages are polyvinyl chloride contaminated with phthalic acid esters, primarily DEHP. Because of its very broad use in plastic and rubber products, DEHP is frequently a laboratory contaminate. The majority of the numerous detections for this chemical are most likely the result of contamination in the collection or analysis process. At this time there is insufficient data to confirm the presence of SOC's in any of Tucson Water's wells.

In addition to the above three compounds, Tucson Water detected two compounds listed as additional SOC's. There is no requirement to monitor for these compounds, but they are analyzed as part of the methods used for required monitoring. The two compounds detected were diethylphthalate and paraquat. Again, staff believe there are insufficient data to suggest that these compounds are actually present in any of our wells.

Perchlorate is both a naturally occurring and man-made chemical. Most of the perchlorate manufactured in the United States is used as the primary ingredient of solid rocket propellant. Perchlorate was detected in two wells at very low concentrations. One well has since been removed from service because it produced sand, the second well was re-sampled and perchlorate was not detected.

Total Trihalomethanes (TTHMs) are formed when chlorine combines with naturally occurring organic material in water. Since the level of organic matter in our groundwater is extremely low, these compounds are found at very low concentrations. Compliance with the TTHM standard is based on the running average quarterly concentration at 16 distribution monitoring points, (2.1 ppb for the year 2001). The compounds which make up the TTHMs, include chloroform, bromodichloromethane, bromoform, and chlorodibromomethane. The highest TTHM result in any system sample was 7.9 ppb and the highest concentration for any of the four compounds was 3.2 ppb for chlorodibromomethane. The standard is 80 ppb.

Lead and Copper are naturally occurring metals, which are generally found at very low levels in source waters. However, these levels can increase when water contacts plumbing materials that contain lead, copper or brass. Infants and young children are more vulnerable to lead in drinking water than the general population. While Tucson Water is well within standards, concerned customers can take an extra precaution to protect children from lead leached from new brass faucets by running the water for a few seconds and using the water for something other than drinking. This is especially important if the water has been sitting in the pipes for a few hours or more. These same precautions also help to give you the best tasting water.

Coliform bacteria are very commonly found in the environment and in the digestive tract of animals. While rarely harmful, Coliform bacteria in drinking water are an indicator that the water may also contain harmful microorganisms.



MONITORING WAIVERS

The Arizona Department of Environmental Quality, the regulatory agency for all public water suppliers in Arizona, grants waivers for certain monitoring requirements during a year. Waivers are granted for specific contaminants if previous monitoring results, and the land uses within a half-mile radius of the well, allows ADEQ to conclude that the risk of contamination by a specific substance is very low.

MONITORING FAILURE

At the end of each quarter, Tucson Water conducts an internal audit of compliance monitoring records to verify that all required monitoring has been completed and reported to the State.

Tucson Water had a minor technical violation of monitoring requirements in the third quarter. This violation occurred when a contract-laboratory failed to notify monitoring staff of a Quality Control failure, requiring a resample before the end of the third monitoring quarter. ADEQ resolved the issue by allowing Tucson Water to resample early in the fourth quarter. The resample was found to be free of contaminants.

A public notification for this violation was published in *The Arizona Daily Star* and *The Tucson Citizen* newspapers on Monday December 24, 2001. As stated in the public notice, this does not affect public health.

WHAT ABOUT CAP WATER?

City of Tucson has rights to approximately 139,000 acre-feet of Colorado River Water per year delivered through the Central Arizona Project (CAP). However, no CAP water was directly delivered to drinking water customers in 2001. At the Clearwater Renewable Resource Facility located in Avra Valley, Tucson Water is recharging a portion of the City's available CAP supply by delivering the river water to shallow basins and allowing the water to percolate (or recharge) naturally through the earth to reach and blend with the groundwater below. Tucson Water began delivery of this blend of recharged CAP water and groundwater May 3, 2001. In the early years of delivery, this new

source will primarily be Avra Valley groundwater. Over time, it will contain an increasing percentage of recharged CAP water. Information on the quality of this blend is contained in this report, and more information is available on Tucson Water's web site.

HOW IS OUR DRINKING WATER TREATED?

The groundwater delivered by Tucson Water meets all drinking water standards without treatment, with the exception of the water supplied from the Tucson Airport Area Remediation Project (TARP) wells. However, approximately 0.8 parts per million (ppm) of chlorine is added to the drinking water supply at well sites, reservoirs and other facilities to provide assurance that water delivered to customers will remain free of microbiological contamination. This also ensures that the water meets microbiological drinking water standards from the time it is pumped from the ground until it reaches the customer's tap.

MORE ABOUT TARP

The TARP program was developed in order to clean and make beneficial use of water contaminated with the industrial solvents, primarily trichloroethylene (TCE). Tucson Water operates TARP under an agreement with the USEPA and other industrial and governmental agencies, which pay for operation of the TARP program. Nine wells extract the contaminated water and deliver it through two pipelines to a treatment plant that removes the contaminants from the water. The TARP treatment plant uses an "air stripping" process which forces volatile contaminants such as TCE to evaporate from the water into air. The air is then passed through activated carbon filters, which removes the airborne contaminants. The TARP plant treated approximately 6.8 million gallons of water per day. During 2001, the plant treated a total of approximately 2.4 billion gallons of water.

This treated water has non-detected levels of TCE. The treated water has been tested on a weekly basis since the start of operations in 1994. The cleaned water flows into the Tucson Water system and is delivered to customers as part of the drinking water supply. This water accounts for approximately 6% of water served on a daily basis by Tucson Water.



WHO DO I CONTACT FOR MORE INFORMATION?

For more information on this Tucson Water report contact Tom Jefferson or Mohsen Belyani with the Water Quality Management Division.

Call 791-5252 or e-mail your questions to tjeffer1@ci.tucson.az.us, or mbelyan1@ci.tucson.az.us.

The Water Quality Management Division also publishes an Annual Microbiological Water Quality report detailing the results of monthly distribution system monitoring. Call 791-5252 for more information.

In 2001, Tucson Water also collected additional monthly water quality data. The results of this additional monitoring are available on the Tucson Water web page, www.cityoftucson.org/water/, and the water quality phone line.

In early 2001 Tucson Water and a number of partners were awarded a \$400,000 grant by the USEPA Environmental Monitoring for Public Access and Community Tracking (EMPACT.) The funds are used to support additional distribution of water quality information to the community.

TELEPHONE NUMBERS:

Tucson Water Quality Automated phone line	791-4227
Tucson Water Public Information Office	791-4331
Tucson Water Quality Management Division	791-5252
Tucson Water Customer Advocate	791-5945
Tucson Water Customer Service/Billing	791-3242
Tucson Water 24-Hour Emergency	791-4133
United States Environmental Protection Agency	
Safe Drinking Water Hotline:	1-800-426-4791
USEPA Website:	www.epa.gov/safewater/
Si usted desea este documento escrito en español, por favor, llame al	791-4331
City of Tucson TTY#:	791-2639



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